they are in contradiction to the best experiments we have on the subject (Sir William Thomson's). A teacher ought to be spared as much as possible from having to tell his students that he does not agree with the writer of a text-book.

The parts of Mr. Cumming's book which we have ventured to criticise refer chiefly to matters of taste. There is no doubt that in the hands of a good teacher the book will prove very useful. We hope that it will have a wide circulation, and that a second edition will soon enable Mr. Cumming to introduce such improvements as on a reperusal of his own book may occur to him.

ARTHUR SCHUSTER

OUR BOOK SHELF

Proceedings of the London Mathematical Society, vol. vii. November, 1875, to November, 1876. (London: Messrs. Hodgson and Son, Gough Square.)

IN the present volume we have about thirty communications made by eighteen writers. Prof. Cayley writes on Three-bar Motion (treating the matter in a different way from that in which it is handled in this same volume by Mr. S. Roberts, the priority of whose results is conceded by Mr. Cayley) on the Bicursal Sextic; Prof. H. J. S. Smith contributes short papers on the value of a certain Arithmetical Determinant and a Note on the Theory of the Pellian Equation; Lord Rayleigh has a note on the Approximate Solution of certain Potential Problems; Mr. Spottiswoode writes on Determinants of Alternate Numbers, working out some suggestions of Prof. Clifford. This last-named gentleman contributes the transformation of Elliptic Functions with a Note, and Free Motion under no Forces of a Rigid System in an n-fold Homaloid.

In Analysis, there are further papers by Mr. J. W. L. Glaisher on an Elliptic Function Identity, and the Summation of the Geometrical Series of the nth Order as a Definite Integral; Prof. Lloyd Tanner on the Solution of Certain Partial Differential Equations of the Second Order (two papers); Mr. J. Hammond on the Relation between Bernouilli's Numbers and the Binomial Coefficients, and on the Mean of the Products of the Different Terms of a Series; Mr. T. Muir on the Transformation of Gauss's Hypergeometric Series into a Continued Fraction; Mr. S. Roberts a Further Note on the Motion of a Plane under Certain Conditions; Mr. Hewitt on a Theorem of Eisenstein's.

Under the heading of Geometry we may class Prof. Rudolf Sturm's paper on Correlative Pencils; Mr. A. B. Kempe's General Method of describing Plane Curves of the nth Degree by Linkwork; Prof. Wolstenholme's Loci Connected with the Rectangular Hyperbola.

There are a few shorter communications. We have said enough to give our mathematical readers an idea of the range of subjects treated in this volume. The names of the authors are a sufficient guarantee that the subjects are ably treated and brought down to the latest accepted results.

A Primer of Chemistry, including Analysis. By Arthur Vacher. (London: J. and A. Churchill, 1877.)

THIS little book attempts to present within the limits of a hundred pages "a general view of the elements of inorganic chemistry." It embodies the experience gained by the author during ten years in which he has been engaged in teaching the subject, and the result is that many points are treated in somewhat novel fashion. The subject is considered as fully as could be expected within the narrow limits mentioned, and the amount of information conveyed is really considerable and generally accurate.

The first sixty-seven pages contain chapters on "Experiments with some of the Elements," "The Use of Symbols" in formulæ, equations, and calculations, "Experiments with some Compounds," "Weights and Measures," "Classification of Compounds," and "List of Substances." The remaining thirty pages or so are devoted to Qualitative Analysis.

Perhaps the greatest novelty introduced is the use of the term *unit* instead of atomic or combining weight, so as to avoid using the terms *atom* and *molecule*, which the author thinks are "unsuitable for ordinary use among beginners;" and of *antimetal* instead of *radicle* (which latter by the way he incorrectly writes "radical"). It may be questioned whether the use of the term "unit" may not interfere with the conception of the meanings to be attached to "atom" and "molecule," which the pupil must gain afterwards. "Antimetal" is objectionable since all radicles are not antimetals; ammonium, for example, is a radicle which plays the part of a metal. Clearly the term is intended as equivalent to "acid radicle," or acid minus its basic hydrogen; it is never used in any other sense in the book, and its use with this restricted meaning may be advantageous, or at least free from objection.

Several items may be pointed out as requiring alteration or improvement; notably the following: that "a *compound*[1] is any substance which is not an element" (p. 11); that chlorine has a "*pale green* colour" (pp. 6 and 61); that oxygen is *insoluble* in water (pp. 39 and 56); and that $KMnO_4$ gives a *red* solution (p. 64). In working with test-tubes the student is several times directed to add "half an inch" of acid or water as the case may be. Of course it is evident what is meant, but test-tubes are of various sizes, and a large excess of acid or other liquid would be used if the directions were followed exactly with large tubes. On p. 77, "take the charcoal quickly to your nose" is another rather curious direction.

The analytical part of the book is the best; the tables throughout being reliable. The detection and separation of cobalt and nickel (Table III., p. 95) might be effected more quickly and easily by other methods than that given; and on p. 87, NO_3 as well as CrO_4 and Fe''' should be mentioned as decomposing H_2S. If these and several other minor improvements be made the "primer" will not be without value in imparting the rudiments of education in chemistry; and in these days when elementary text-books are becoming so numerous, may fairly count on being appreciated as it deserves by the class of students for whom it is intended.

W. H. W.

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.*]

Hibernation of Birds

IN NATURE (vol. xv., p. 465) there is a review of "Palmén on the Migration of Birds," and in the course of it the reviewer takes occasion to refer to what he calls the "hibernation mania" as one that is now and again revived, in spite of the fact that the migration of birds is fully proved, and that no evidence at first hand has ever been produced in favour of the supposition that birds ever lie dormant.

Having frequently heard my brother-in-law, Sir John McNeill, relate a circumstance which occurred to himself proving that swallows do occasionally lie dormant, I wrote to him asking him for the particulars. I now inclose his reply, which perhaps you will publish, as it may possibly elicit other evidence on the same matter.

Gilbert White's conviction that swallows do occasionally lie dormant in this country, was mainly founded on the fact that instances are not uncommon of swallows appearing suddenly

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[1] A *chemical* compound being meant as is evident from the context.

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during warm sunny days in winter, and again disappearing on the return of cold. This fact it is certainly very difficult to account for on any other supposition. ARGYLL

Argyll Lodge, Kensington, April 11

" In your letter received last night you tell me of an article in NATURE the author of which seems to deny that swallows ever hibernate, and asserts that no one has yet testified to the fact from his own personal observation. That, however, is a mistake, for I have stated and I now repeat that I have seen swallows in large numbers hibernating. The circumstances were these:—

"About twenty-five miles south of Teheran, the capital of Persia, there is a village called Kenara-gird near which is a stream of brackish water running in a deep bed with nearly perpendicular banks some forty or fifty feet high. Being largely impregnated with salt this stream is rarely if ever frozen, and in frosty weather is resorted to by flights of wild ducks. During a frost of unusual severity I went from Teheran to Kenara-gird, accompanied by Sir Henry Rawlinson, for the purpose of duck-shooting, the severity of the frost promising good sport. Having slept at the village we next morning followed the downward course of the stream along the north bank, and had proceeded about a mile, I should think, when we came to a place where there had quite recently been a small land-slip. The brink of the bank to the extent of perhaps twenty feet in length, and ten or twelve broad in the middle, tapering off to each end, had slipped, but had not fallen down the bank. Between this detached portion and the perpendicular face about ten feet high, from which it had broken off, we saw, to our great surprise, a number of swallows, not less, I am sure, than twenty or thirty, lying, as I at first supposed, dead, but on taking up one of them I found that it was alive but dormant; it was warm and its breathing was quite perceptible. I examined a considerable number, and found that they were all alive and breathing, but none of them gave any sign of consciousness. My attention was then attracted to the perpendicular face on our left, from which the slip had broken off, and which was perforated by a vast number of holes each about the size of a rat-hole. On looking into such of these as I was tall enough to see into, I found in all of them swallows in the same dormant state. I was able with finger and thumb to pull out swallows from several of these holes, and in each case found that the hole which penetrated horizontally a considerable way into the bank, contained more swallows in the same condition. In no case did I see one lying on another—they were all lying singly with their heads inwards, each head touching the tail of the bird before it. How far these holes penetrated into the bank, or what number of swallows each contained I did not ascertain, but it is plain that the original entrance to these dormitories, must have been in the external face of the portion that had slipped, which as I have stated, was, in the middle, from ten to twelve feet thick. The holes in the undisturbed portion may probably have been of equal or greater length, and if so the number of swallows hibernating there must have amounted to many hundreds."

Villa Poralto, Cannes, April 6

The Swallows and Cuckoo at Menton

THE swallow that arrived here on March 19 remained solitary until April 5. Early that morning a second arrived and entered the same room as the first. I saw them flying about together in the forenoon, and these two remain the only feathered occupants of that chamber. In the afternoon of the same day, however, a party of ten arrived and distributed themselves among the houses.

Madame Valetta, of whom I spoke in my previous letter (NATURE, vol. xv., p. 488), assures me that not during the last fifty years has one swallow preceded its fellows by so long an interval as this year; but perhaps it is only that her attention has not been drawn so much to the subject. It is certain, however, that unless more are yet to come, the swallows are this year fewer than ordinary by more than one-half. The opinion of the natives is that they have perished at sea.

I heard the cuckoo for the first time this year on April 1. But a lady had to'd me that she had heard it nearly a week before. DOUGLAS A. SPALDING

Cabrolles, près de Menton, France, April 13

Greenwich as a Meteorological Observatory

THE facts of observation appealed to by Mr. Eaton with the view of proving that Greenwich is, from artificial causes, more than half a degree warmer than the south-east of England generally, and is therefore not a suitable place for a meteorological observatory of the first order, evidently call for a closer critical examination than they have yet received. If from the sixteen stations within a radius of sixty miles from the metropolis given in the paper on "The Temperature of the British Islands," we omit those which are clearly inadmissible for the comparison with Greenwich owing to their position or to the short time during which observations were made, there remain the following eight stations as suitable for comparison:—Cardington, 52° 7′ lat. N.; Royston, 52° 2′; Colchester, 51° 53′; Hartwell, 51° 49; Oxford, 51° 46′; Great Berkhamstead, 51° 45′; Chatham, 51° 23′; and Aldershot, 51° 15′. The mean temperature of these eight stations, allowing for elevation, is 50°·6, and the mean temperature of Greenwich, 51°·1, results substantially agreeing with those given by Mr. Eaton.

It is necessary, however, to observe that the mean position of these places does not agree with that of Greenwich. Thus while the latitude of Greenwich is 51° 28′ north, the mean latitude of the eight stations is 51° 45′, or 0° 17′ farther north, their true mean position being about two miles due north of St. Albans. For this difference in latitude a correction of fully 0°·2 is required, judging from the position of the isothermal lines. The figures then stand thus: mean temperature of Greenwich, 51°·1; of the eight stations, 50°·8. On comparing the monthly means of the eight stations with those of Greenwich, it is seen that the residual excess of Greenwich is all but wholly occasioned by the high mean temperatures of June, July, August, and September, which are in each case 0°·9 higher than the means of the eight stations, these eight stations being nearly all outside or on the outskirts of the patch of high temperature around London during the summer months. It follows that the 0°·3 of excess of annual temperature at Greenwich over the eight stations is accounted for by the higher temperature of four out of the twelve months, and consequently cannot be due to artificial sources of heat in London, such as the consumption of fuel.

When drawing the isothermals of the British Islands seven years ago, no district of Great Britain occasioned so much trouble and uncertainty as the south-east of England, owing to the meagreness of the materials available for the purpose. Since, however, immediately to westward, the mean temperature of Oxford was seen to be 50°·4, Aldershot 51°·2, and Osborne 51°·8, it was inferred as the most probable state of the case that the mean temperature increased southwards over the south-east of England in the manner indicated by the annual isothermals accompanying the paper. This supposition was confirmed by the temperatures at Colchester and Chatham, the only two stations furnishing satisfactory data on the point, for while at Colchester, for instance, the mean temperature was 0°·5 lower than that of Greenwich, no less than 0°·4 of this difference was due to the lower temperature of the east coast at Colchester as compared with Greenwich during the five months beginning with December, when the temperature in the south of England increases from east to west.

The coast stations of the Channel could not be considered as furnishing authoritative evidence on the question, owing to the irregular distribution of their temperature, which seemed to indicate certain obscure and ill-understood causes in operation modifying the climates of that coast. The force of this remark will be apparent from the following mean temperatures:—Helston, 53°·9; Truro, 52°·2; Torquay, 51°·6; Sidmouth, 51°·1; Bournemouth, 51°·5; Ventnor, 52°·4; and Worthing and Eastbourne, both 50°·7. It is perhaps scarcely necessary to remark that it would be a mistake to attempt to draw any conclusion from differences of mean temperatures of different stations amounting to 0°·3 and under, seeing that the English observations generally were made with thermometers in protecting-boxes quite open on one side, and therefore exposed in varying degrees to indirect radiation from walls and other objects.

While Mr. Eaton has thus failed to prove from past observations that the consumption of fuel and the massing together of living beings in London has raised the mean temperature at Greenwich Observatory to the extent of half a degree, or indeed to any appreciable extent, above that of the south-east of England generally, it might nevertheless be well, seeing the question has been raised, to do something towards definitely answering it, by instituting at Greenwich and at about a dozen stations distributed over the south-east of England, observations of the temperature of the air, strict uniformity being secured by employing the same pattern of thermometer-box and by placing it under the same conditions at each place as regards height above the

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